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### Copyright Infringement of Video Games: When the Chips Are Down

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## I. VIDEO GAMES

### A. Copyright

#### 1. Copyright Infringement Of Video Games: When The Chips Are Down

A recent federal district court decision has given a video game manufacturer the power capsules it needs to gobble infringing ghost monsters. In *Midway Manufacturing Co. v. Strohon*<sup>1</sup> the court held that a modification kit infringed Midway's distinct copyright in the computer program stored in the memory chips directing the popular Pac-Man video game.

Midway Manufacturing Co. ("Midway") holds copyright registrations for the audiovisual effects in the Pac-Man video game and for the computer programs imprinted in the six silicon Read Only Memory (ROM) chips that direct the game's play sequences and audiovisual displays.<sup>2</sup> Pac-Man is played on machines marketed by Midway and decorated with the well-known Pac-Man cartoon figures.

Defendants, referred to collectively by the *Midway* court as "Slayton,"<sup>3</sup> developed a kit ("Cute-See") designed to make the game more challenging for experienced players. Such a kit would find a ready market in video arcade operators who suffer from sagging revenues when experienced Pac-Man players either avoid the game or play continuously on a single quarter. The kit included pressure-sensitive graphics which incompletely obscured the Pac-Man name and cartoon figures on the exterior of the game machines.<sup>4</sup>

The kit's five ROM chips, which purchasers were to substitute for the corresponding Pac-Man chips, were central to the controversy in *Midway*. The sixth Pac-Man chip was to be removed and the sound system disconnected. With the chip removed and the kit's other ROM chips in place, the "characters" and other visual aspects of the game would be quite changed; at an advanced stage of the game the kit would make it more difficult for the "gobbler" character to elude pursuers.

The court issued a preliminary injunction in March 1982, prohibiting Slayton from infringing any of Midway's copyrights in its Pac-Man

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1. 564 F. Supp. 741 (N.D. Ill. 1983).

2. *Id.* at 743. Programs are imprinted on ROM chips in the form of miniscule patterns of electronic circuits. Each chip has a specific location on a circuit board in a machine.

3. *Id.* at 742. Defendant Frederick Slayton a/k/a Roger Strohon was an "operator" of video game machines, including the Pac-Man unit.

4. *Id.* at 744.

game or misusing the Pac-Man trademarks.<sup>5</sup> In June 1983, after reviewing briefs from parties and amicus curiae,<sup>6</sup> the court enjoined Slayton from marketing the modification kit<sup>7</sup> but denied a motion to hold Slayton in civil contempt of the preliminary injunction because no copies of the kit were actually sold.<sup>8</sup>

*Midway* raises a number of issues which continue to be debated in the rapidly evolving field of computer copyright law, particularly within the context of protection for video games. As a threshold issue, amicus challenged Midway's right to control the use or alteration of the copyrighted portions of Pac-Man game machines by the operators after its first sale of those machines.<sup>9</sup> Amicus relied on patent cases in its argument, but the court found these inapposite.<sup>10</sup> Another recent Midway video game infringement case, *Midway Manufacturing Co. v. Artic International, Inc.*, held that defendant's "speed-up kit," which altered the pace of Midway's copyrighted "Galaxian" game, created a "derivative"<sup>11</sup> work based upon "Galaxian." Under the Copyright Act, copyright owners have the exclusive right to authorize the preparation of derivative works.<sup>12</sup> Consequently, a licensee who installed the kit without Midway's authorization to create a derivative work would be a direct infringer of Midway's copyright and defendant seller would be a contributory infringer.<sup>13</sup>

Following *Artic*, the *Midway* court concluded that the Cute-See kit could not be distributed if it infringed any of the copyrights connected

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5. *Id.* at 742.

6. Amicus curiae submitting briefs on behalf of Midway was SHIELD Video Game Industry Legal Justice Committee. *Midway*, 564 F. Supp. at 742.

7. *Id.* at 742-43. In addition to copyright infringement, marketing the Cute-See kit would also have violated the "false designation of origin" section of the Lanham Act, § 43(a), 15 U.S.C. § 1125(a) (1976). The Cute-See graphics were intended to cover the Pac-Man name but left the well-known cartoon figures visible on the game machine. The figures are widely associated with Midway's Pac-Man. The court concluded that typical consumers would have a "natural tendency" to assume that Cute-See and Pac-Man emanated from the same source. *Id.* at 754.

8. *Id.* at 742.

9. *Id.* at 744.

10. *Id.* at 746.

11. 704 F.2d 1009, 1013 (7th Cir. 1983).

A 'derivative work' is a work based upon one or more preexisting works, such as a translation, . . . sound recording, art reproduction, . . . or any other form in which a work may be recast, transformed, or adapted. A work consisting of editorial revisions, annotations, elaborations, or other modifications which, as a whole, represent an original work of authorship, is a 'derivative work.'

17 U.S.C. § 101 (1982).

12. 17 U.S.C. § 106(2) (1982).

13. *Midway*, 704 F.2d at 1013.

with Pac-Man. Slayton could not use as a defense Midway's sale of the machines in which Cute-See would be used.<sup>14</sup>

Slayton, however, argued that the audiovisual material produced by the Cute-See kit in the course of play was not sufficiently similar to Pac-Man to infringe Midway's "audiovisual works" copyright.<sup>15</sup> To determine whether there was infringement, the court applied the Seventh Circuit's analysis articulated in another Pac-Man case, *Atari, Inc. v. North American Philips Consumer Electronics Corp.*<sup>16</sup> Where plaintiff has a valid copyright, infringement is established by proving that the defendant copied the plaintiff's work. Absent direct evidence, copying may be inferred where defendant has access to the work and there is "substantial similarity" between the accused work and the copyrighted work.<sup>17</sup> Copyright law does not extend protection to ideas but only to particular expression of ideas.<sup>18</sup>

In *Atari*, defendant's access was not disputed. The court explained that although the "idea" of a maze-chase game is unprotectible, the audio and visual aspects of the game constitute the copyrightable expression of the game's "idea."<sup>19</sup> Pac-Man's distinctive central characters distinguished it from conceptually similar video games.<sup>20</sup> The Seventh Circuit found that the disputed "K.C. Munchkin" game's central "gobbler" and "ghost monster" characters were so similar visually, aurally, and behaviorally to their Pac-Man counterparts that an "ordinary observer" could conclude only that North American copied Pac-Man.<sup>21</sup>

Following the reasoning in *Atari*, the *Midway* court held that there was no infringement of the audiovisual copyright in Midway's Pac-Man game because the distinctive copyrightable Pac-Man characters were not present in the Cute-See version of the game.<sup>22</sup> Midway established the *prima facie* validity of its Pac-Man copyrights by registering both the audiovisual display and underlying programs.<sup>23</sup> The burden was then on

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14. *Midway*, 564 F. Supp. at 746.

15. The Copyright Act defines "audiovisual works" as:

[w]orks that consist of a series of related images which are intrinsically intended to be shown by the use of machines, or devices such as projectors, viewers, or electronic equipment, together with accompanying sounds, if any, regardless of the nature of the material objects, such as films or tapes, in which the works are embodied.

17 U.S.C. § 101 (1982).

16. 672 F.2d 607 (7th Cir. 1982).

17. *Id.* at 614.

18. *Id.* at 615; 17 U.S.C. § 102(b) (1982).

19. *Atari*, 672 F.2d at 617.

20. *Id.*

21. *Id.* at 618.

22. *Midway*, 564 F. Supp. at 747.

23. See 17 U.S.C. 410(c) (1982).

the defendant to overcome this presumption of validity.<sup>24</sup> Slayton maintained that the two were so intertwined that the court's conclusion that the audiovisual copyright was not infringed should also mean that the underlying program was not infringed.<sup>25</sup>

The *Midway* court rejected this reasoning. In *Stern Electronics, Inc. v. Kaufman*,<sup>26</sup> the court recognized the possibility of designing a game that could infringe an audiovisual display but use a different computer program. The converse of *Stern* was presented here: the possibility of infringing a game's computer program but not its audiovisuals. Observing that two distinct types of creative processes were involved in creating computer programs and audiovisuals, the judge expressly recognized that the audiovisuals and computer programs connected with the game were separately copyrightable.<sup>27</sup>

Having concluded that the underlying program directing the games was copyrightable, the court considered the most significant and the most difficult issue: whether the four instruction ROMs were developed to operate the Pac-Man game or contained a "copy" of the computer program.<sup>28</sup> The court concluded that the ROMs were entitled to copyright protection as a computer program and that the Cute-See ROMs infringed Midway's copyright.<sup>29</sup>

The court reasoned that ROMs were encompassed within the definitions of "copy" and "computer program" in the Copyright Act.<sup>30</sup> ROMs contain the computer program stored in its "object code" form; it is this binary machine-readable form of the human-readable "source code" which is used directly by the computer to carry out its operations.<sup>31</sup> Midway claimed copyright protection for its object code pro-

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24. See *Flick-Reedy Corp. v. Hydro-Line Mfg. Co.*, 351 F.2d 546, 549 (7th Cir. 1965), cert. denied, 383 U.S. 958 (1966).

25. *Midway*, 564 F. Supp. at 747.

26. 669 F.2d 852, 855 (2d Cir. 1982) (audiovisual displays copyrightable as audiovisual works although underlying computer programs were not registered).

27. *Midway*, 564 F. Supp. at 749.

28. *Id.*

29. *Id.*

30. "'Copies' are material objects . . . in which a work is fixed by any method now known or later developed, and from which the work can be perceived, reproduced, or otherwise communicated, either directly or with the aid of a machine or device." 17 U.S.C. § 101 (1982). "A 'computer program' is a set of statements or instructions to be used directly or indirectly in a computer in order to bring about a certain result." This definition was added to 17 U.S.C. § 101 (1976) by the Computer Software Copyright Act, Pub. L. No. 96-517, 94 Stat. 3015, 3028 (1980).

31. FORTRAN and BASIC are familiar examples of "source codes." Source code is transformed within the computer into "object code" instructions; these direct the computer's activity. Object code is embedded in electronic circuits on silicon chips, disks, or magnetic

gram. Programs written in source code are "clearly eligible" for copyright protection.<sup>32</sup> The court found it "certain as a general matter" that object code was also intended to be protected by current copyright legislation.<sup>33</sup> As the court observed, it would be "pyrrhic indeed" if the stored object code version of the same protected source code program could be freely reproduced without constituting an infringement.<sup>34</sup>

The court found no basis for the argument that object code stored on a chip within the machine may be copied while the same code stored externally on a disk or tape may not be copied.<sup>35</sup> While it is true that ROM chips are integral parts of the games machine as a form of electrical circuitry, they also serve as repositories for computer instructions. They are thus more than uncopyrightable utilitarian objects and not more utilitarian than tapes or disks.<sup>36</sup> ROM chips are "firmware," sharing attributes of both software (programs) and hardware.<sup>37</sup> A ROM chip performs the same function as a disk or tape—it stores information which directs the operations of a computer. Accordingly, the court concluded that Midway's copyright of its object code computer program stored in ROM chips was valid.<sup>38</sup>

A straightforward reading of the cited sections of the Copyright Act, as well as legislative history,<sup>39</sup> compels agreement with the *Midway* court's conclusions. Yet, legal authority exists supporting Slayton's argument that object code stored on ROMs is ineligible for copyright protection.

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tape. Object code instructions may be represented as "1" or "0", indicating the presence or absence of an electrical charge. Written in this binary form, object code may be "read" directly by trained humans. See Note, *Copyright Protection for Computer Programs in Read Only Memory Chips*, 11 HOFSTRA L. REV. 329, 342 (1982).

32. *Midway*, 564 F. Supp. at 750 (citing 17 U.S.C. § 102(a) (1982) which extends copyright protection to "original works of authorship fixed in any tangible medium of expression, now known or later developed from which they can be perceived, reproduced, or otherwise communicated, either directly or with the aid of a machine or device.").

33. *Id.* (noting that "object code alone is able to be used 'directly' by a computer in carrying out its operations").

34. *Id.* at 751.

35. Programs and data bases are included in the definition of literary works, defined in the Copyright Act as "works, other than audiovisual works, expressed in words, numbers, or other verbal or numerical symbols or indicia, regardless of the nature of the material objects, such as . . . tapes, disks, or cards, in which they are embodied." 17 U.S.C. § 101 (1982). See N. BOORSTYN, COPYRIGHT LAW, §§ 2:21 (1981).

36. *Midway*, 564 F. Supp. at 751-52.

37. *Id.* at 751.

38. *Id.* at 752.

39. See *infra* notes 49 and 57 and accompanying text.

In *Data Cash Systems, Inc. v. JS&A Group, Inc.*,<sup>40</sup> plaintiff claimed infringement of the ROM copy of a copyrighted source code program directing a hand-held chess game.<sup>41</sup> The federal district court held that the source code program was not a copy in its object code phase.<sup>42</sup> Computer programs in forms that were not human-readable were nothing more than a "mechanical tool or machine part."<sup>43</sup>

In *Apple Computer, Inc. v. Franklin Computer Corp.*, the district court denied a motion for a preliminary injunction against Franklin's alleged infringement of Apple's copyrights on programs expressed in object code and fixed in ROMs.<sup>44</sup> The court questioned whether copyright was limited to works read by a human reader.<sup>45</sup> The court was not satisfied that object code in binary or chip form was copyrightable expression because its purpose and function was to control a machine and not to communicate with a human audience.<sup>46</sup>

Judicial concern for human readability is rooted in the hoary case of *White-Smith Music Publishing v. Apollo Co.*,<sup>47</sup> which held that a perforated piano roll was not a copy of plaintiff's musical composition because it was unintelligible to the human eye. Although the 1976 Copyright Act provided copyright protection for copies perceptible or communicated "with the aid of a machine or device,"<sup>48</sup> reference to conventional literary forms has slowed acceptance of new forms of expression as proper subjects for copyright.<sup>49</sup>

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40. 480 F. Supp. 1063 (N.D. Ill. 1979), *aff'd on other grounds*, 628 F.2d 1038 (7th Cir. 1980).

41. *Id.* at 1065.

42. *Id.* at 1068. The court considered the case under the 1909 Copyright Act because the marketing of the game occurred before the 1976 Act became effective. The court stated in *dicta* that its conclusion would have been the same under the 1976 Act. *Id.* at 1006 n.4.

43. *Id.* at 1065.

44. 545 F. Supp. 812 (E.D. Pa. 1982), *rev'd* 714 F.2d 1240 (3d Cir. 1983) (appeal heard subsequent to the ruling in *Midway*). The fourteen programs at issue were "operating systems programs," designed to manage the internal function of the machines or facilitate use of "application programs." The latter were used to perform a specific task for the computer user. See Note, *supra* note 31, at 347. See generally Note, *supra* note 31 for excellent human-readable explanations of complex computer terminology and concepts and for full treatment of the copyright protection for programs in ROMs. See also Note, *Copyright Protection of Computer Program Object Code*, 96 HARV. L. REV. 1723 (1983) for argument in favor of copyright protection of object code and presentation of roots of controversy.

45. *Apple Computer*, 545 F. Supp. at 821.

46. *Id.* at 824. The court suggested that its ruling would not necessarily apply to object code programs in video arcade games which created visual displays for the players. *Id.* at 825. See *Baker v. Selden*, 101 U.S. 99 (1979) for root of system/expression distinction in copyright cases.

47. 209 U.S. 1 (1908).

48. 17 U.S.C. § 101 (1982); See *supra* note 30 and accompanying text.

49. Congress established the National Commission on New Technological Uses of Copy-

Denying copyright to programs in object code would leave no copyright protection for the embodiment of those programs in a ROM chip. Relegating a ROM chip to the status of a machine part, as Slayton argued in *Midway*, would create a loophole in copyright coverage permitting direct duplication of chips.<sup>50</sup> Focusing on the physical aspects of ROMs neglects their true purpose as repositories of original human expression. It was the intent of Congress to extend protection to such expressions, not to expose them to profligate copying.<sup>51</sup> Congress recently passed a new law<sup>52</sup> which extends copyright protection to "mask works,"<sup>53</sup> the imprinted design patterns on semi-conductor chips. The extension of copyright protection to something this far removed from human readability clearly indicates the congressional intent to extend copyright protection as broadly as possible to chips and to whatever information may be fixed on them.

In *Tandy Corp. v. Personal Microcomputers, Inc.*,<sup>54</sup> the district court refused to follow the dicta in *Data Cash*. The court denied defendant's motion to dismiss on the ground that a chip was not a copy of plaintiff's copyrighted original program and therefore the duplication of a chip was

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righted Works (CONTU) in recognition of the need to revise the 1909 Copyright Act, particularly in the area of computer technology. Act of Dec. 31, 1974, Pub. L. No. 93-573, Title II, 88 Stat. 1873 (1974). CONTU's recommendations regarding programs were adopted in an amendment to the 1976 Act. Computer Software Copyright Act, Pub. L. No. 96-517, 94 Stat. 3015, 3028-29 (1980) (Act added definition of computer program to § 101 and revised § 117). The CONTU majority opinion recommended extending copyright protection to object code programs, including those stored in tape and disks. See *Final Report of the National Commission on New Technological Uses of Copyrighted Works (CONTU)*, dated July 31, 1978, reprinted in COPYRIGHT L. REV. (CCH) [Extra Ed. No. 2, Aug. 31, 1978] at 53-57 [hereinafter cited as CONTU Final Report]. Lingered doubts were expressed in a dissent by Commissioner Hersey, who would limit copyright protection to works that communicate to human beings. See *id.* at 69-75.

50. See Wilbur, *Copyright Registration for Secret Computer Programs: Robbery of the Phoenix's Nest*, 24 JURIMETRICS J. 357 (1984) for discussion of current limitations of copyright protection for computer programs and proposal for revising registration requirements.

51. See *supra* note 49 and *infra* note 57 and accompanying text.

52. See *Reagan Signs Copyright Law for Computer Chips*, L.A. Times, Nov. 10, 1984, Part IV (Business), at 1, col. 2. See also Cohodas, *Computer Chips Protected, Trademark Statute Clarified*, 42 CONG. Q. WEEKLY REP. Oct. 13, 1984 at 2641-43 (HR 6163 creates a new chapter (9) of Title 17 of the U.S. Code specifically to prevent computer chips from unauthorized copying: provides 10 years of protection).

53. "'Mask work' means the 2-dimensional and 3-dimensional features of shapes, pattern, and configuration (sic) of the surface of the layers of a semi-conductor chip product, regardless of whether such features have an intrinsic utilitarian function that is not only to portray the appearance of the product or to convey information." 17 U.S.C. § 901, reprinted in COPYRIGHT LAW REP. (CCH) ¶ 20,264, at 10,701 (June, 1984). Under § 909, protected mask works will be designated with the letter M in a circle or the words "mask work," the year of fixation in the chip and the name of the owner of the work. *Id.* at 10,705-10,706.

54. 524 F. Supp. 171, 175 (N.D. Cal. 1981).



not an infringement.<sup>55</sup> Based on the legislative history and language of the 1976 Copyright Act, the court determined that computer programs were "works of authorship" fixed in the tangible medium of a silicon chip<sup>56</sup> and that Congress intended a broad reading of "fixation" to include such works.<sup>57</sup>

The Third Circuit in *Williams Electronics, Inc. v. Artic International, Inc.*<sup>58</sup> affirmed *Tandy*. Artic had sold as "kits" printed circuit boards containing programs fixed in ROMs "virtually identical" to plaintiff's copyrighted program for its Defender video game.<sup>59</sup> The Third Circuit rejected the "human readability" and "machine part" arguments posed by Artic who challenged the designation of ROMs as "copies" of programs.<sup>60</sup> According to the court, the issue was not whether the ROM itself was copyrightable, but whether the plaintiff's expression in an original work embedded in ROMs satisfied the statutory fixation requirement.<sup>61</sup> In concluding that it did, the court agreed with the *Tandy* court's determination that Congress intended an "expansive interpretation of the terms 'fixation' and 'copy' which [would] encompass technological advances."<sup>62</sup> The court also agreed with *Tandy* that Congress did not intend to create a loophole by confining infringement to copying text while excluding duplication of programs fixed on chips.<sup>63</sup>

The *Midway* court relied extensively on the latter two cases in rejecting the *Data Cash* and *Apple* designation of ROMs as utilitarian objects.<sup>64</sup> The Third Circuit, in turn drew heavily from *Williams*, *Tandy*, and *Midway* when it considered *Apple Computer, Inc. v. Franklin Com-*

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55. *Id.* at 175.

56. *Id.* at 173.

57. *Id.*

Under the bill it makes no difference what the form, manner, or medium of fixation may be—whether it is in words, numbers, notes, sounds, pictures or any other graphic or symbolic indicia, whether embodied in a physical object in written, printed, photographic, sculptural, punched, magnetic, or other stable form, and whether it is capable of perception directly or by means of any machine or device "now known or later developed."

(quoted by the *Midway* court from H.R. REP. NO. 1476, 94th Cong. 2d Sess. 52 (1976), reprinted in 1976 U.S. CODE CONG. & AD. NEWS, 5659, 5665.

58. 685 F.2d 870 (3d Cir. 1982).

59. *Id.* at 872.

60. *Id.* at 877.

61. *Id.* at 874.

62. *Id.* at 877. Echoing *Tandy* on Congressional intent, the court quoted the same material and the language of the statutory definition of "copy" found in 17 U.S.C. § 101 (1982).

63. *Id.*

64. *Midway*, 564 F. Supp. at 752.

puter Corp. on appeal.<sup>65</sup> The court in *Apple Computer* held that a computer program is a "literary work," whether in its source code or in the object code version in a ROM chip, and is protected from unauthorized copying.<sup>66</sup> The Third Circuit also rejected the district court's distinction, for copyright purposes, between operating systems programs and application systems programs; both types of programs instruct the computer to do something and it was the instructions that Apple copyrighted.<sup>67</sup> Most convincing to the court was that Section 101 itself does not make the distinction.<sup>68</sup> The court rejected Franklin's argument that an operating system was just a machine part, noting that it could also be stored outside the machine on disks or magnetic tape.<sup>69</sup> The court added that copyright is not precluded because a copyright is put to a utilitarian use.<sup>70</sup>

In *Apple Computer, Inc. v. Formula International, Inc.*<sup>71</sup> the defendant attempted to distinguish operating systems programs on ROMs as uncopyrightable "ideas" and "processes," whereas applications systems programs contain "expressions" communicated to the user when the program is run on a computer.<sup>72</sup> The Ninth Circuit found that the defendant provided "absolutely no authority" for such limited copyright protection: "The computer program when written embodies expression; never has the Copyright Act required that the expression be communicated to a particular audience."<sup>73</sup>

*Midway* provides an important link in a chain of cases extending copyright protection beyond the limitation of the human intelligibility doctrine to "non-visible" programs. As *Franklin* and *Formula* illustrate, the impact of this chain of decisions interpreting the 1976 Copyright Act has been felt outside of the narrow confines of the video game arcade.

Having found *Midway*'s object code program in ROM chips copyrightable, the *Midway* court next considered whether the *Cute-See* ROMs infringed the *Pac-Man* ROMs. Since access to the *Pac-Man* ROMs was undisputed, copying could be inferred if the *Cute-See* and

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65. 545 F. Supp. 812 (E.D. Pa. 1982), *rev'd* 714 F.2d 1240 (3d Cir. 1983). See *supra* notes 44-46 and accompanying text.

66. *Apple Computer*, 714 F.2d at 1249.

67. *Id.* at 1251.

68. *Id.* at 1252.

69. *Id.* at 1251.

70. *Id.* at 1252 (citing *Mazer v. Stein*, 347 U.S. 201, 218 (1954) and majority opinion in *CONTU Final Report*, *supra* note 49, at 53).

71. 725 F.2d 521 (9th Cir. 1984).

72. *Id.* at 523-24.

73. *Id.* at 525.

Pac-Man ROMs were "substantially similar."<sup>74</sup> There was uncontradicted expert testimony that there were "virtually an infinite number of ways" to write a set of program instructions to produce the Pac-Man game sequences; thus there was no necessity to track the Pac-Man program sequences.<sup>75</sup>

After comparing the four allegedly infringing ROMs to the Pac-Man ROMs, the expert witnesses found an extremely high "ratio of identity" between Pac-Man and Cute-See instruction locations.<sup>76</sup> The location of the Cute-See program alterations also supported an inference of copying: these were "patched" mostly into the blank or uncoded locations at the end of two of the Pac-Man ROMs.<sup>77</sup>

The court based its conclusion that the program on four Cute-See instruction ROMs infringed the program on the corresponding Pac-Man ROMs on the high degree of identity between them and the virtual impossibility that two programmers working independently would write such nearly identical programs.<sup>78</sup> The court was not persuaded by Slayton's argument that all five of Slayton's ROMs and all six of Midway's ROMs must be substantially similar to support infringement.<sup>79</sup> Analogizing to book publishing, the court observed that just as there would be infringement in copying just one chapter, so there is piracy if data in two Pac-Man ROMs were not copied while instructions in four other ROMs were copied.<sup>80</sup>

The *Midway* court applied two methods for finding substantial similarity between the two video games because of the dual nature of the materials being compared. It first compared the behavior of cartoon figures on the video screen for determining whether there was infringement of Midway's audiovisual copyright.<sup>81</sup> The second substantial similarity test, for the underlying "non-visible" instruction programs, relied on comparisons of strings of object code in binary form. In both cases it was necessary to first transform the disputed material into a form readily perceptible by humans with the aid of a machine or device.

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74. *Midway*, 654 F. Supp. at 752.

75. *Id.* at 753.

76. *Id.* at 752-53. The ratio found was ninety-seven percent; overall, eighty-nine percent of 16,000 "bytes" of information in the Pac-Man ROMs were identically reproduced in the corresponding Cute-See ROMs. There were long strings of identical corresponding locations, one of which covered all but sixteen of 4,000 locations on the Pac-Man ROM.

77. *Id.* at 753.

78. *Id.*

79. *Id.*

80. *Id.*

81. See *Atari, Inc. v. North Am. Philips*, 672 F.2d 607, (7th Cir. 1982) for discussion of appropriate tests for substantial similarity, particularly for video games.

The substantial similarity analyses underscore the correctness of the court's conclusion that chips are more than just machine parts; mere machine parts cannot be transformed into expressions of human thought. The analyses also reveal the complexities inherent in applying tests derived from older media to new technologies. An ordinary reasonable observer is unable to compare strings of binary code for overall similarity. The question of what degree of similarity is required for a finding of infringement of object code programs remains unanswered.<sup>82</sup>

Recent interpretations of existing copyright law protecting audiovisual works and computer programs should affect the extent of piracy of profitable video games. The new "mask works" law will protect manufacturers of computer chips used in increasingly pervasive settings, incidentally including video game components. The overall effect of expanding copyrightable subject matter will result in increased protection for the fruits of intellectual labor and entrepreneurial spirit in a rapidly expanding new technology.

*Barbara B. Caretto*

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82. See Note, *supra* note 31, at 361-68, for discussion exploring this question in context of proposal for new court procedures for infringement of firmware and software.

## 2. Copyright Protection Of Video Games: Pac-Man And Galaxian Granted Extended Play

Pac-Man and Galaxian have once again been granted extended play of their copyright protections.<sup>1</sup> In *Midway Manufacturing Co. v. Artic International, Inc.*,<sup>2</sup> the Seventh Circuit affirmed a district court's injunction prohibiting the infringement by Artic of Midway's copyrighted Pac-Man and Galaxian video games. The injunction prohibited Artic's manufacture or distribution of circuit boards for video machines that can be used to play games similar to those protected by Midway's copyright. The court upheld what is fast becoming an established principle of copyright law, that video games are subject to copyright protection as audiovisual works under the 1976 Copyright Act.<sup>3</sup>

Midway is the manufacturer of the video games, Pac-Man and Galaxian. Inside each video game machine are printed circuit boards which store the images and sounds produced by the machine when the games are played. The circuit boards also serve to control the rate of speed at which the games are played.<sup>4</sup>

Artic sold printed circuit boards used inside video game machines. One of the circuit boards sold by Artic, when inserted into a Galaxian game machine, accelerated the rate of speed at which Galaxian was

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1. See *Atari, Inc. v. North Am. Philips Consumer Elecs. Corp.*, 672 F.2d 607 (7th Cir. 1982) (defendants' video game violated Atari's copyright by adopting the same basic characters of Pac-Man, and because of the substantial similarity of defendants' game to Pac-Man), *cert. denied*, 459 U.S. 880 (1982); *Midway Mfg. Co. v. Dirkschneider*, 543 F. Supp. 466 (D. Neb. 1981) (defendant infringed Midway's copyright by manufacturing and selling video games virtually identical to Midway's Pac-Man and Galaxian video games).

2. 704 F.2d 1009 (7th Cir.), *cert. denied*, — U.S. —, 103 S. Ct. 176 (1983).

3. See, e.g., *Stern Elecs., Inc. v. Kaufman*, 669 F.2d 852, 855-56 (2d Cir. 1982); *Williams Elecs., Inc. v. Artic Int'l, Inc.*, 685 F.2d 870, 874 (3d Cir. 1982); *Midway Mfg. Co. v. Dirkschneider*, 543 F. Supp. 466 (D. Neb. 1981).

17 U.S.C. § 101 (1982) provides that:

"Audiovisual works" are works that consist of a series of related images which are intrinsically intended to be shown by the use of machines or devices such as projectors, viewers, or electronic equipment, together with accompanying sounds, if any, regardless of the nature of the material objects, such as films or tapes, in which the works are embodied.

17 U.S.C. § 102(a) (1982) provides that:

Copyright protection subsists, in accordance with this title, in original works of authorship fixed in any tangible medium of expression, now known or later developed, from which they can be perceived, reproduced, or otherwise communicated, either directly or with the aid of a machine or device. Works of authorship include . . .

(6) motion pictures and other audiovisual works. . . .

4. See *Midway*, 704 F.2d at 1010, for a more detailed discussion of how video game machines operate.

played.<sup>5</sup> Artic also sold a circuit board that stored a set of images and sounds nearly indistinguishable from Midway's Pac-Man, so that when Artic's circuit board was inserted into a machine and played, the video game looked and sounded like Pac-Man.<sup>6</sup>

Midway filed suit against Artic in federal district court for copyright infringement of its Galaxian and Pac-Man video games.<sup>7</sup> The district court denied Artic's motion for summary judgment and granted Midway's motion for a preliminary injunction. On appeal Artic argued that, on the basis of the merits set forth in Midway's case, there was no showing that Midway had a valid copyright infringement.<sup>8</sup>

The Seventh Circuit first determined whether video games are properly defined as audiovisual works protected by the 1976 Copyright Act.<sup>9</sup> Audiovisual works are defined in Section 101 as a "series of related images."<sup>10</sup> Had the court narrowly construed the definitional phrase, "a series of related images," to mean a set of images presented in a *fixed* sequence of images and sounds which reappear every time the game is played, video games would not meet the definition of an audiovisual work. This is because every time a video game is played, a different sequence of images and sounds is produced on the screen of the video game machine, depending upon how the game is played.<sup>11</sup> Instead, the court adopted a *broad* interpretation of the phrase. "[S]eries of related images" means "any set of images displayed as some kind of unit."<sup>12</sup> This conclusion is consistent with earlier decisions involving the copyrightability of video games which held that the repetitive sequence of the images and sounds satisfied the fixation requirement of Title 17, Section 102(a), of the United States Code.<sup>13</sup>

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5. By increasing the rate in which the game is played, the profits to the video arcade operator are increased because the player's playing time is cut short by the speeded-up rate. *Id.* at 1013; JONES, COPYRIGHT, ENTERTAINMENT AND SPORTS LAW 17 (1982).

6. *Midway*, 704 F.2d at 1010-11.

7. *Midway Mfg. Co. v. Artic Int'l, Inc.*, 547 F. Supp. 999 (N.D. Ill. 1982).

8. *Midway*, 704 F.2d at 1011.

9. *Id.* at 1011; See 17 U.S.C. § 101 (1982).

10. 17 U.S.C. § 101 (1982); See *supra* note 3.

11. *Midway*, 704 F.2d at 1011. See also Culler, *Copyright Protection for Video Games: The Court in the Pac-Man Maze*, 32 CLEV. ST. L. REV. 531, 560 (1983-84).

12. See *WGN Continental Brcdst'g Co. v. United Video, Inc.*, 693 F.2d 622, 627 (7th Cir. 1982) (news program and a thematically related textual display transmitted on the same TV signal was a single audiovisual work. The court supported its holding by noting that the legislative history suggested that the Copyright Act be construed flexibly so as to adopt new technologies).

13. See *Williams Elecs., Inc. v. Artic Int'l, Inc.*, 685 F.2d 870 (3d Cir. 1982) (affirmed injunction restraining defendant from infringing plaintiff's copyright on audiovisual works and computer program used in video game); *Stern Elecs. v. Kaufman*, 669 F.2d 854 (rejected de-

The court next considered whether the playing of video games involved creative effort of the player, rather than that of the game inventor.<sup>14</sup> The *Midway* court recognized that the particular order of images that appears on the screen of a video game machine when it is played is not identical to the set of images stored in the machine's circuit boards. This presented another difficulty in classifying video games as audiovisual works. However, a video game player does not have the ability to create any sequence he desires out of the images stored in the circuit boards of the machine. The court ruled that "[p]laying a video game is more like changing channels on a television than it is like writing a novel or painting a picture."<sup>15</sup> The player is confined to choosing only those sequences made available by the game.<sup>16</sup> Therefore, it was the inventor, not the player, who the court considered to be the creative actor behind the playing of the game.

The court also rejected Artic's contention that, because the circuit boards in which video games are fixed and patentable, they are not copy-rightable. The court was quick to point out that *Midway* did not assert copyright protection in the design of the circuit boards, but in the distinctive images and sounds stored in those boards.<sup>17</sup>

The court was equally unsympathetic to Artic's argument that the 1976 Copyright Act did not apply to *Midway's* video games because the 1980 amendment of Section 117 did not apply to copyrights granted prior to the amendment's enactment.<sup>18</sup> Artic argued that, since *Midway's* copyright was in existence before the amendment took effect, the original Section 117 required the court to look to the 1909 Act and to the

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defendant's contention that sights and sounds in video games failed to meet the fixation requirement and affirmed preliminary injunction barring defendant from distributing video games); *Midway Mfg. v. Dirkschneider*, 543 F. Supp. 466 (fixation requirement was met because the audiovisual works were fixed in the printed circuit boards of the video games; a preliminary injunction issued).

14. *Midway*, 704 F.2d at 1011.

15. *Id.* at 1012.

16. *Id.* See also *Williams Elecs. v. Artic Int'l, Inc.*, 685 F.2d at 874; *Stern Elecs. v. Kaufman*, 669 F.2d at 856.

17. *Midway*, 704 F.2d at 1012. Artic cited *Apple Computer, Inc. v. Franklin Computer Corp.*, 545 F. Supp. 812 (E.D. Pa. 1982) (concerning computer program copyrights rather than copyrights in audiovisual works fixed in such programs), in support of the assertion that patentable circuit boards are not copyrightable. The court found the case distinguishable on its facts.

18. Section 117, which provides for the exclusive rights of computer program owners states: "Notwithstanding the provisions of section 106, it is not an infringement for the owner of a copy of a computer program to make or authorize the making of another copy or adaptation . . . Adaptations so prepared may be transferred only with the authorization of the copyright owner." 17 U.S.C. § 117 (1982).

common law. The court ruled that it was unnecessary to determine whether the 1980 amendment was inapplicable.<sup>19</sup> The court was convinced by the language and legislative history of the 1980 amendment that the original Section 117 was not intended to permit the pirating of works stored in computers, but was "intended only to leave unaltered the existing law governing the exclusive rights of owners of copyrights in computer programs."<sup>20</sup>

Assuming the video games were copyrightable, Artic then argued that the copyrights were invalid because the original publication of the copyright lacked the proper notice required by Section 401 of the Copyright Act.<sup>21</sup> Artic alleged that Midway obtained the copyright to the video games in 1979 and 1980 from the Japanese company that invented the games. The Japanese company that invented the games did not give notice of its copyrights prior to assignment of the copyrights to Midway in 1979 and 1980. Therefore, Artic contended, the copyrights were invalid.<sup>22</sup> However, the court rejected this argument, relying on Section 405(a)(2) of the Copyright Act which allows a copyright owner five years in which to register a work where notice of the copyright was previously omitted, and found that Midway registered the games within five years of their acquisition from the Japanese company.<sup>23</sup>

The final and most significant issue decided by the court was whether circuit boards that speed up the rate of play of Midway's video games constituted an infringement of Midway's copyrights. Artic argued that there was no copyright infringement because speeding the play of a video game was akin to playing a phonograph record of 33 RPM at 45 or 78 RPM, which would probably not be a copyright infringement.<sup>24</sup> The court rejected the analogy. "There is an enormous demand for speeded-

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19. *Midway*, 704 F.2d at 1012.

20. *Id.* See also H.R. REP. NO. 97-1307, 96th Cong., 2nd Sess. 27 (1980) (Part I) (Judiciary Committee), reprinted in 1980 U.S. CODE CONG. & AD. NEWS 6460, 6486; H.R. REP. NO. 97-1307, 96th Cong., 2nd Sess. 27 (1980) (Part II) (Committee on Government Operations), reprinted in 1980 U.S. CODE CONG. & AD. NEWS 6509.

21. 17 U.S.C. § 401(a) (1982) provides:

Whenever a work protected under this title is published in the United States or elsewhere . . . a notice of copyright as provided by this section shall be placed on all publicly distributed copies from which the work can be visually perceived, either directly or with the aid of a machine or device.

22. 17 U.S.C. § 405(a)(2) (1982). The court suggested that if Artic had maintained that Midway failed to put notice of copyright on any of the video games Midway distributed in the United States, or if there had been an allegation that the copyright infringements of Midway's video game machines were due to the omission of the notice of copyright originally published in Japan, the court might have decided differently. *Midway*, 704 F.2d 1013.

23. *Midway*, 704 F.2d at 1013.

24. *Id.*



up video games but . . . little if any demand for speeded-up records.”<sup>25</sup> The court further held that, because “[a] speeded-up video game is a substantially different product from the original,”<sup>26</sup> the speeded-up game is a derivative work and protected by Title 17, Section 106(2) of the United States Code.<sup>27</sup> The court concluded that it was the intent of Congress that the language of Section 106 be construed broadly enough to accommodate new technologies such as speeded-up video games.<sup>28</sup>

*Midway* illustrates that video game machines, as audiovisual works, are within the sphere of protection that Congress intended in the 1976 Copyright Act. Prior to the enactment of the 1976 Copyright Act, the rights of artists and inventors were guarded under the 1909 Copyright Act. However, the 1909 Act only protected those forms of expression or media that were explicitly outlined in the Act. Thus, the 1909 Copyright Act was inadequate, for it failed to provide for technological growth.<sup>29</sup> So, with the advent of the 1976 Copyright Act, courts have followed congressional intent and construed the 1976 Act to incorporate new technologies.<sup>30</sup> Cases involving the copyrightability of video games have similarly followed suit.

Significantly, the Seventh Circuit in *Midway* characterized video games as audiovisual works, thereby bringing them within the sphere of protection of the 1976 Copyright Act. The *Midway* court deviated from prior cases involving video games which focused on the fixation requirement of Section 102(a).<sup>31</sup> Instead, the court directed its attention to the definitional phrase, “series of related images,” in ruling that video games are audiovisual works subject to copyright protection. By defining the

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25. *Id.* See also *supra* note 5.

26. *Id.* at 1014.

27. 17 U.S.C. § 106(2) (1982) states that a copyright owner has exclusive rights to produce derivatives based on the original work. Derivative work is defined as “[W]ork based upon one or more preexisting works, such as a translation, musical arrangement, dramatization, fictionalization, motion picture version, sound recording, art reproduction, abridgment, condensation, or any other form in which a work may be recast, transformed or adapted.” 17 U.S.C. § 101 (1982). See also *Atari v. North Am. Philips Consumer Elecs. Corp.*, 672 F.2d at 618-19 n.12.

28. *Midway*, 704 F.2d at 1014. See also *WGN Continental Brdcast'g*, 593 F.2d 622.

29. McKenna, *Copyrightability of Video Games: Stern and Atari*, 14 LOY. U. CHI. L.J. 391 (1983).

30. H.R. REP. NO. 1476, 94th Cong., 2nd Sess. 47, reprinted in 1976 U.S. CODE CONG. & AD. NEWS 5659, 5660; see also McKenna, *Copyrightability of Video Games: Stern and Atari*, 14 LOY. U. CHI. L.J. 391 (1983).

31. See, *Atari*, 672 F.2d 607; *Midway*, 543 F. Supp. 466; *Williams Elecs.*, 685 F.2d 870. These decisions limited the scope of analysis to whether video games are within the subject matter of copyright protection. Whereas, here, the court ruled that video games are audiovisual works and are protected under the 1976 Copyright Act.